ELECTRICITY AND MAGNETISM.

(1) *Elementary Electricity and Magnetism.* By W. S. Franklin and B. Macnutt. Pp. viii + 174. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1914.) Price 1.25 dollars net.

(2) *Advanced Theory of Electricity and Magnetism.* By W. S. Franklin and B. Macnutt. Pp. vii + 300. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1915.) Price 2.00 dollars net.

THESE books are written purely with a view to the practical application of electricity and magnetism. The choice of matter is excellent from this point of view, and it is all presented in a lucid, readable, and original manner, being illustrated with a large number of excellent diagrams. Experimental phenomena are usually described first, and to give students a grasp of their meaning mechanical analogies are given. Most of these analogies are excellent, but one gets the impression that on the whole too much attention is devoted to them, and that some of them could profitably be omitted. The introduction of the terms abampere, abvolt, and abohm for the absolute units of current, E.M.F., and resistance is a feature of the books. The electromagnetic system only is used, and in the advanced book the authors boldly declare that they are ignoring the electrostatic system altogether, a procedure that is perhaps wise, considering that the practical aspect of the subject predominates.

(1) The elementary book commences with a description of the most important phenomena in electricity from a practical point of view. Only the most elementary things in magnetism are described, and this part of the subject is of importance only in its relation to electricity. The action of electromagnets on wires carrying currents is described very early in the book, and the reverse phenomenon—the action of currents on magnets, which one is accustomed to find as a fundamental principle, does not appear till later. Great prominence is given to the "side push" on wires in a magnetic field (the term is the authors'), and, once described, its applications to the D'Arsonval galvanometer and to the dynamo follow. The tangent galvanometer is not described, as it is not a practical instrument. The "side push" is again employed in connection with magnetic intensity, which is defined as "the side force per abampere per unit length of wire." The chief practical things to which attention is given are the dynamo, motor, transformer, and induction coil.

(2) The advanced book is more of the usual type. The usual accounts of magnetic phenomena are given and the definitions here are normal. When electromagnetism is introduced a novel definition of unit of current—the abampere—is given. This is defined as "the force per unit length of wire per unit field intensity." The meaning of the authors is clear, but their wording is unfortunate, as they define current as the "force." Whereas in the elementary book attention is devoted chiefly to the dyamo, etc., the advanced book seems to be written principally for telegraph engineers, as a very large amount of space is devoted to waves on wires. As an application of permanent magnetism, a chapter is devoted to ships' magnetism and the compensation of the compass. The chapters on electrostatics suffer from vagueness on account of the ignoring of the electrostatic system of units. For instance, the capacity of a parallel plate condenser is given as

$$C \text{ (in farads)} = 1/B \,.\, a/x,$$

where "a" is the area of one plate in sq. cm., x the distance apart of the plates, and B is a constant $= 1{\cdot}131 \times 10^{13}$. However, again the practical aspect is kept in view, and space is devoted to such things as the design of insulators for cables and the capacity of a transmission line.

Both books will be found of great value to students to whom the practical side of electricity and magnetism is the all-important thing, and in fact they will also be profitable to others if read in conjunction with some of the more abstract treatises.

A large number of examples is given with each chapter.

J. R.

OUR BOOKSHELF.

Mechanism of Steam Engines. By Prof. W. H. James and M. W. Dole. Pp. viii + 170. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1914.) Price 8*s.* 6*d.* net.

THE purpose of the authors in producing this book has been to provide an elementary treatise on the kinematics of reciprocating steam engines and steam turbines, and to make clear to the beginner the mechanical principles on which a steam engine operates. Special attention is given to valve gears and governing devices; the underlying heat theory is not treated. The book opens with a general discussion of a reciprocating steam engine, followed by types of single-valve engines. The valve ellipse, together with the Zeuner, Reuleaux, and Bilgram valve diagrams are described, and some typical single-valve problems are worked out. Centrifugal-throttling, crank-shaft and other governing devices are included, also riding cut-off valves and their governing devices. The book closes with sections dealing with reversing gears,

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valve setting, and turbine valve mechanisms and governors.

The volume is noteworthy for the clearness of the drawings (mostly taken from working drawings), and for the lucidity of the text. It is difficult, however, to state what precisely would be its position in the engineering courses at colleges in this country. This is owing to the matter being almost wholly descriptive. Students of engineering learn best by doing, not by merely listening or reading. Numerous valve diagrams are given, but no student desires to copy these, and no definite exercises are given to be worked out by the student himself. As a minor matter, we may point out that it would have been an advantage if even one leading dimension had been inserted in the detail drawings. It is difficult for beginners to sort out which devices are suitable for large and which for small engines. The book, however, can be recommended to any student who wishes to improve his knowledge of the construction of valve and governor details.

Reports from the Laboratory of the Royal College of Physicians, Edinburgh. Edited by Dr. J. J. Graham Brown and Dr. J. Ritchie. Vol. xviii. (Edinburgh: Oliver and Boyd, 1915.)

THE directors of every research institution have to face a peculiar difficulty connected with publication. In issuing an account of the various inquiries conducted in the laboratories under their charge two modes of publishing are open to them. They may issue a special report, or they may allow the workers in the laboratories to contribute their results to appropriate professional journals or proceedings of societies. A special report is expensive; it does not secure the ear of the scientific public so well as professional journals do. The laboratory of the Royal College of Physicians in Edinburgh has combined these two methods; it has collected the papers contributed to various journals by its workers during 1913–14, and issued them as the thirteenth volume of its Reports. In all there are thirty-two papers, every one of them representing a definite contribution to the basal subjects of medicine. Four papers give an account of the researches of Dr. J. P. McGowan into the nature of sarcocyst, associated with the disease of sheep known in Scotland as "Scrapie."

Four papers are devoted to human anatomy, Dr. J. S. Fraser's sections of the inner ear being of particular merit. The remaining papers are devoted to biological chemistry, pathology, and bacteriology. We note particularly the research carried out by the late Dr. Alexander Bruce—whose death was a serious loss to British neurology—and Dr. James W. Dawson on a curious form of tumour which occurs in the central nervous system. A study of the minute structure of these neuromata supports the multicellular theory of nerve-fibres. Dr. D. P. B. Wilkie's important observations on the clinical signs of acute obstruction of the appendix vermiformis as distinguished from acute inflammation of the appendix also appears in this volume of reports. The thirteenth volume is one on which its editors, Dr. J. J. Graham Brown and Dr. James Ritchie, superintendent of the laboratory, may be warmly congratulated.

The Poison War. By A. A. Roberts. Pp. 144. (London: W. Heinemann, 1915.) Price 5*s*. net.

MR. A. A. ROBERTS, who is described as a member of the Chemical Society of France and also of the Society of Chemical Industry, has given the public a book to which no one with any chemical knowledge will deny the epithet "remarkable." Two or three short extracts from its pages will perhaps best illustrate its value.

On page 57 we find "The white smoke referred to, upon the explosion of German shells, is caused by the union of phosphoric and phosphorus acids with the oxygen of the air." On page 90 we are told: "Toluene is a colourless liquid obtained from resins such as tolu: the latter being the product of a South American tree. Some of the medicinal preparations of this resin are well known to the public, as 'Balsam of Tolu' and 'Friars Balsam.'" In reference to guncotton, on page 91 we learn: "Reverting to the subject of gun-cotton, this explosive is now made by soaking cotton or waste in nitric acid. Cotton is indispensable, as it absorbs the oxygen and nitrogen contained in the acid, and is a combustible substance." On page 98 we read: "Nitro-glycerine, or even gun-cotton, if burnt in an open vessel, will not explode, but the moment they are fired by detonation explosion follows, the explosion being due to decomposition." The non-poisonous character of nitro-glycerine is illustrated by the following statement on page 99: "A laboratory employé, in another instance, partook of two ounces of nitro-glycerine, mistaking it for chocolate, and on the morrow was none the worse for his stupidity."

Indian Mathematics. By G. R. Kaye. Pp. 73. (Calcutta and Simla: Thacker, Spink and Co., 1915.)

MR. G. R. KAYE's booklet gives a summary of the actual contents of Indian mathematical works, translations of original passages, an approximate chronology, and a bibliography. The net result of recent work in this field is to reduce still more the claims once made on behalf of Indian mathematicians, both in respect of priority and in that of originality; two main questions are still unanswered—who invented the decimal notation now current, and what is the complete history of the Pellian equation? Mr. Kaye suggests that India is probably indebted to China for some of its analysis, just as it is certainly to Greece for its geometry (in Arabic translations or otherwise); it is to be hoped that Chinese documents will be forthcoming to throw light on these and other matters. Meanwhile, such a work as this of Mr. Kaye's is very useful as a trustworthy conspectus of what is actually known about early Indian mathematics at present.

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